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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-2903
Plant ID No.:	055-00124
Applicant:	Daniels Fabrication, Inc.
Facility Name:	Bluefield
Location:	Bluefield
NAICS Code:	333131
Application Type:	Construction
Received Date:	November 8, 2011
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	$1000.00
Date Received:	November 8, 2011
Completeness Date:	November 17, 2011
Due Date:	February 15, 2011
Newspaper:	*Bluefield Daily Telegraph*
Applicant Ad Date:	November 11, 2011
UTMs:	Easting: 481.7 km Northing: 4,127.1 km Zone: 17
Description:	After the fact permit for the construction of a mining machinery manufacturing facility (metal fabrication shop with a coating operation).

DESCRIPTION OF PROCESS

Daniels Fabrication Inc. (Daniels) specializes in manufacturing of coal handling and processing equipment. The Bluefield facility fabricates and/or manufactures components and/or pieces of equipment for a specific site. Daniels mainly uses several different raw materials of which is mainly carbon steel in a variety of different shapes and sizes. Depending on the specific component been manufactured, the steel is cut, sized, and sized to the desired dimensions. The

parts of the specific components are either welded together or connected with mechanical fasteners. Once assembled, the component(s) may be surface cleaned before being coated with a protective coating.

The Bluefield facility has an abrasive cleaning area (shed) and paint booth (paint bay). Components that require a specialized surface treatment (i.e. galvanized) are shipped to another facility for that specialized protective coating and then shipped to the customer.

The components manufactured by Daniels are usually exposed to abrasive and/or corrosive environments. Thus, the engineering designs or specifications for these components require a high performance coating such as BAR-Rust® (an epoxy) or FAST CLAD® (Urethane) for a protective film.

SITE INSPECTION

This writer conducted an announced site visit of the proposed facility on November 22, 2011. Night Shift Manager was present during this visit. The Bluefield facility is located adjacent to the Mercer County Airport, which is off County Highway 37/1 (Markell Drive). According to the manager, the Bluefield facility has been in existence since the late 1960s. Due to terrain and vegetation, the writer was not able to estimate the nearest residential structure. Using Google Earth with a Imagery Date of June 7, 2009, the writer estimated the nearest structure other that the ones associated with the airport to be at least 400 feet away.

During this visit, the writer noted that activities as proposed were located as described in the application. Here are a few minor deviations:

- The source is employing an air assisted (air atomization) sprayer instead of an airless sprayer.
- Using a coating not identified in the application (Sherwin Williams Fast CLAD® DTM Urethane B65W851).
- Using methyl ethyl ketone (MEK) to clean equipment that was used to apply the above-mentioned coating. This is the recommended solvent for this coating from the coating manufacturer.

Most of the coatings applied at the facility are two part epoxies. A finish or topcoat is sometime requires. The FAST CLAD® coating does not require a primer or topcoat. There are issues with applying epoxies with an airless sprayer system. Sherwin Williams does not recommend the use of a air-assisted airless sprayer to apply their FAST CLAD® Urethane. This

urethane has a VOC content of 2.61 pounds per gallon of coating. MEK is not a hazardous air pollutant (HAP). Thus, the use of MEK would not have an effect on the facility's status as an area source for HAPs.

Daniels' reasoning for switching to this urethane was to significantly reduce the drying time of the components that had been coated. At 77^0F, components and parts are dry enough to be moved after two hours. Parts or components must remain in the paint booth until they are dry enough to be handled. Thus, the facility's lack of a good dry area or curing booth physically limits (bottleneck) the coating activities at the Bluefield facility.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions generated at this facility are mainly from the abrasive blasting, applying surface coatings and associated cleanup of coating equipment activities. The pollutants emitted are particulate matter (PM) and volatile organic compounds (VOCs), which include hazardous air pollutants (HAPs).

Abrasive Blasting Emissions

The metal fabricated parts and/or components may need to be cleaned prior to being painted. The facility uses abrasive blasting to accomplish this. Daniels projects the maximum usage of black beauty as the abrasive media for this activity to be 540 tons per year. The PM emissions were calculated using U.S. EPA's AP-42 a "Compilation of Air Pollutant Emission Factors," 5th edition; specifically Chapter 13.2.6, Abrasive Blasting. As the process is uncontrolled, the applicant used the "Sand Blasting of mild steel panel, 5 mile per hour (mph) wind speed" factor of 27 pounds of total PM per 1,000 pounds of abrasive. The PM rate from the abrasive blaster booth was predicted to be 14.6 tons per year. Of this 14.6 tons of PM, 7 tons would be classified as particulate matter less than 10 microns (PM_{10}).

Coating Emissions

VOC estimates were determined by using a mass balance approach and assuming that all of the VOCs in the coating were emitted. The applicant proposed to use at least ten different coating at the facility, which includes primers. Daniels estimated the maximum amount of coatings to be applied at 7,310 gallons per year. Daniels estimated the VOC emissions from coatings to be 10.3 tons per year, which is based on the annual use of each specific coating. The writer considers this approach to restrictive for minor sources in attainment areas. Thus, the writer estimated the potential VOC emission from coatings to be 18.4 tons per year. This

estimate was based on the facility consuming 7,310 gallons of Motor Blue, Quick Dry Enamel, which has a VOC content of 5.04 pounds of VOCs per gallon of coating.

A material balance also calculates the particulate matter (PM) emissions from the use of coatings. This is achieved by taking the density of each specific coating and subtracting the VOC portion. The remaining portion is considered as solids for the purpose of this analysis, even though it may also include water and/or other non-VOC solvents. The transfer efficiency of the coating method (type of spray equipment) used is taken into consideration to derive uncontrolled emissions. It should be noted that Daniels' transfer efficiency of 30% is the industry standard for conventional air atomizing sprayers. The method of estimating PM emissions from the application of surface coating yielded a PM rate of 2.2 tons per year with an average hourly rate of 1.5 pounds per hour.

The writer does not prefer this method of estimating PM emissions from surface coating operations. The problem with the above method is the above method is based on using exact amounts of each specific coating every year. This adds unnecessary restriction on the specific coatings and amounts in the permit. The writer prefers to estimate PM emissions based on the highest solids content of the proposed coatings. In addition, the average coating usage proposed is 2.5 gallons per hour. The writer doubles this coating rate for the purposes of determining a maximum hourly PM rate, which is presented in the follow table.

Table #1 PM Emissions from the Application of Surface Coatings

Application System	Coating	Hourly Coating Usage (gallons/hour)	Transfer Efficiency (%)	Solids Content (lb/gal)	Removal Efficiency of the Filter Media (%)	PM & $PM_{2.5}$ Emission Rate lb/hr
Conventional Sprayer	Bar-Rust 235	5	30	7.7	90	2.7

Daniels has proposed an annual limit of 7,310 gallons of coatings at the facility. This usage limit would restrict the facility's worst-case potential of PM and $PM_{2.5}$ to just 1.9 tons per year after controls.

Equipment Cleaning

Daniels proposed several different solvents for clean-up purposes. The facility uses the coating manufacturers recommend solvent for the particular coating that was applied to clean the

sprayer and hose afterwards. The VOC emissions estimated in the application was nearly 10 tons per year. The writer reviewed these solvents and the current one being used to clean-up after applying FAST CLAD® (MEK). All of these solvents contain 100% VOCs. Thus, the VOC content per gallon of solvent was considered, which ranged from 6.68 pounds of VOC per gallon to 7.71 pounds of VOCs per gallon. Daniels estimated the annual consumption of solvent to be 2,890 gallons per year. Using the highest VOC content solvent (T-9 thinner) and the projected maximum usage rate, the writer estimated the facility's maximum potential to emit of VOCs from cleanup activities to 11.4 tons per year.

The following table is a summary of the proposed emissions from the Bluefield Facility;

Table #2 - Summary of PM and VOC Emissions from the Facility		
Process	Pollutant	Annual Emission Rate (TPY)
Surface Cleaning –Abrasive	PM & $PM_{2.5}$	14.6
Surface Coatings	PM & $PM_{2.5}$	1.9
Facility Total	PM	16.5
Surface Coatings	VOCs	18.4
Equipment Cleaning – Solvent	VOCs	11.1
Facility Total	VOC	29.5

Most of the coatings and solvents used at the facility contain components or compounds that are classified as HAPs under the Clean Air Act. The applicant estimated the facility's potential to emit of total HAPs to be 13.6 tons per year. The writer reviewed the list of proposed coatings to determine which coating has the highest HAP content. The Sherwin-Williams' Quick Dry Enamel – Motor Blue has the highest HAP content, which is 3.5 pounds of HAP per gallon of coating. Assuming, the facility would consume 7,310 gallons of the Motor Blue, the facility's potential to emit of total combine amount of HAPs would be 12.8 tons per year.

Daniels uses several different solvents that depend on the actual coating being applied. Of the 6 different solvents used at the facility, two of them are made entirely of HAPs (Xylol, and T-5 thinner), two of them contain zero HAPs (MEK and Naphtha), and the last two solvents contain between 60 to 80% HAP ingredients. Assuming the facility would consume 2,890 gallons of Xylol in a year, the facility's HAP potential from this would be 10.4 tons per year. Thus, the facility could have the potential to emit of 22.8 tons of HAPs per year.

REGULATORY APPLICABILITY

45CSR7 To Prevent and Control Particulate Matter Air Pollution From Manufacturing Processes and Associated Operations

The purpose of this rule is to prevent and control particulate matter air pollution from manufacturing process and associated operations. The facility performs surface cleaning (abrasive blasting), and surface coating which have the potential to generate particulate matter.

The activities of interest with surface cleaning are the abrasive blasting, which includes the blasting shed. Under Rule 7, this source would have allowable PM rate of 10 pound per hour according to 45CSR§7-4.1. The source projected a PM hourly emission rate of 5 pounds per hour, which is based on a facility-operating schedule of 5,824 hours per year and an annual PM rate of 14.6 TPY.

The Rule 7 also sets an allowable PM rate for the surface coating activities at 28 pounds of PM per hour, which is based on a process weight rate of 20 tons of fabricated steel being coated. Referring to Table 1 of this evaluation, the projected PM rate from surface coating is 2.7 pounds per hour, which is less than 10% of the allowable limit for this activity.

Both activities are subject to a visible emission limitation of 10% opacity. In lieu of requiring visible emission checks, the writer recommends that the permit establish a rigid maintenance schedule for the control equipment and measures. According to Daniels, the filter for the paint booth is scheduled to be replaced every month. The writer recommends having the permit require the filter media be replaced at least once every sixty days. The abrasive blasting shed is a fully enclosed building. Thus, the writer recommends month inspections of the enclosure and deficiencies being repaired within 10 days of being identified. The writer believes these control measures satisfy the requirements of 45CSR§7-5.1.

45CSR13 - Permits for Construction, Modification, Relocation and Operation of Stationary sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The purpose of this rule is to set forth the procedures for stationary source reporting, and the criteria for obtaining a permit to construct and operate a new stationary source which is not a major stationary source, to modify a non-major stationary source, to make modifications which are not major modifications to an existing major stationary source and to relocate non-major stationary sources within the State of West Virginia.

Daniels' paint booth and abrasive blasting area has a potential to emit greater than 6 pounds per hour and 10 tons per year of particulate matter and volatile organic compounds. Thus, Daniels must obtain a construction permit for the paint booth as required in 45CSR§13-5.1. The company has complied with the public review procedures in 45CSR§13-8.3. by publishing a legal ad in *The Bluefield Daily Telegraph* on November 11, 2011. In addition, the applicant submitted a complete application and paid the permit application fees.

45CSR30 Requirements for Operating Permits

The source does not have the potential to emit 100 tons or more of VOCs per year. In addition, emissions of HAPs are below the major source trigger levels of 10 tons per year of a single HAP and 25 tons per years of total combine HAPs. Thus, the source is not subject to a MACT standard as a major source or required to obtain a Title V operating permit in accordance with 45 CSR 30. Therefore, the source is subject to 45 CSR 22 as a 9E – Miscellaneous Surface Coating.

FEDERAL REGUALTIONs

40CFR63 Subpart HHHHHH National Emission Standard for Hazardous Air Pollutants; Paint Stripping and Miscellaneous Surface Coating Operating At Area Sources

However, this facility is possibly subject at least one (40 CFR 63, Subpart HHHHHH) or more "area source" rules under Part 63 (GACT). The State of West Virginia has elected not to take delegation of several of these rules, which includes Subpart HHHHHH. Therefore, this permitting authority did not review the facility's proposed operations and control measures with respect to complying with the limitation or requirements in Subpart HHHHHH or any of the other "area source" rules.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

Cumene

Under the proposed Guidelines for Carcinogenic Risk Assessment (U.S. EPA, 1996), it is concluded that the carcinogenic potential of cumene cannot be determined because no adequate data, such as well-conducted long-term animal studies or reliable human epidemiological studies, are available for any assessment. Of the available data, the critical effect noted from an inhalation study of rat was increase kidney weights in female rats and adrenal weights in male and female rats. EPA has classified cumene as a Group D, not classifiable as to human carcinogenicity.

Ethyl benzene

Ethyl benzene is mainly used in the manufacture of styrene. Acute (short-term) exposure to ethyl benzene in humans results in respiratory effects, such as throat irritation and chest constriction, irritation of the eyes, and neurological effects such as dizziness. Chronic (long-term) exposure to ethyl benzene by inhalation in humans has shown conflicting results regarding its effects on the blood. Animal studies have reported effects on the blood, liver, and kidneys from chronic inhalation exposure to ethyl benzene. Limited information is available on the carcinogenic effects of ethyl benzene in humans. In a study by the National Toxicology Program (NTP), exposure to ethyl benzene by inhalation resulted in an increased incidence of kidney and testicular tumors in rats, and lung and liver tumors in mice. EPA has classified ethyl benzene as a Group D, not classifiable as to human carcinogenicity.

Toluene

Toluene is a clear, colorless liquid with a distinctive smell. Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline and other fuels from crude oil and making coke from coal. Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

Toluene may affect the nervous system. Low to moderate levels can cause tiredness, confusion, weakness, drunken type actions, memory loss, nausea, loss of appetite, and hearing and color vision loss. These symptoms usually disappear when exposure is stopped. Inhaling High levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death. High levels of toluene may affect your kidneys.

Studies in humans and animals generally indicate that toluene does not cause cancer. The EPA has determined that the carcinogenicity of toluene cannot be classified.

Xylene

Commercial or mixed xylene usually contains about 40-65% *m*-xylene and up to 20% each of *o*-xylene and *p*-xylene and ethyl benzene. Xylenes are released into the atmosphere as fugitive emissions from industrial sources, from auto exhaust, and through volatilization from their use as solvents. Acute (short-term) inhalation exposure to mixed xylenes in humans results in irritation of the eyes, nose, and throat, gastrointestinal effects, eye irritation, and neurological effects. Chronic (long-term) inhalation exposure of humans to mixed xylenes results primarily in central nervous system (CNS) effects, such as headache, dizziness, fatigue, tremors, and incoordination; respiratory, cardiovascular, and kidney effects have also been reported. EPA has classified mixed xylenes as a Group D, not classifiable as to human carcinogenicity.

Methyl Isobutyl Ketone (MIBK)
Under the draft revised cancer guidelines (U.S. EPA, 1999), the data for MIBK are inadequate for an assessment of human carcinogenic potential. No data were located regarding the existence of an association between cancer and MIBK exposure in humans, but studies of the in vivo and in vitro genotoxicity of MIBK overwhelmingly provided negative responses. It was noted that the critical effect of inhalation exposer to mice and rats was reduced fetal body weight, skeletal variations, and increased fetal death. U.S. EPA determined that the available data was inadequate for an assessment of human carcinogenic potential.

Naphthalene
Using criteria of the 1986 Guidelines for Carcinogen Risk Assessment, naphthalene is classified in Group C, a possible human carcinogen. This is based on the inadequate data of carcinogenicity in humans exposed to naphthalene via the oral and inhalation routes, and the limited evidence of carcinogenicity in animals via the inhalation route. Using the 1996 Proposed Guidelines for Carcinogen Risk Assessment, the human carcinogenic potential of naphthalene via the oral or inhalation routes "cannot be determined" at this time based on human and animal data; however, there is suggestive evidence (observations of benign respiratory tumors and one carcinoma in female mice only exposed to naphthalene by inhalation [NTP, 1992a]). Additional support includes increase in respiratory tumors associated with exposure to 1-methylnaphthalene. Critical effect from oral exposure of naphthalene is decreased mean terminal body weight in males. U.S. EPA lists naphthalene as possible human carcinogenic.

AIR QUALITY IMPACTS ANALYSIS

The writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed construction does not meet the definition of a major source as defined in 45CSR14.

MONITORING OF OPERATIONS

The VOC and HAP emissions rates proposed in the application indicate that the facility would not exceed the above the major source trigger levels. These estimates was based on actual usage that was multiplied by a factor of 1.5 to account for maximum usage of specific coatings. To account for this potential to emit in a permit, the permit would have to establish specific usage limits for each proposed coating and solvent consumed at the facility.

The writer believes this approach for a source engaged in custom manufacturing would either setup the permittee to be out of compliance with the permit or require the permittee to obtain additional modification permits or submit administrative update requests whenever there is a new project being manufactured with a coating specification that cannot be achieved with the proposed coatings.

Establishing a maximum VOC and HAP content for the coatings and solvents to be used at the facility in the permit would prevent unnecessary permit changes or compliance issues. This approach would allow the permittee to have flexibility in selecting coatings/solvents without the need to ask for permission for every change. The proposed emission rates needed to be adjusted to account for the flexibility. These emission rates were discussed in the "Estimate of Emissions by Reviewing Engineer" Section of this evaluation. Thus, the draft will establish the following limits for coatings and solvents:

- Coatings limited to a VOC content of 5.05 pounds of VOC per gallon as applied. (Condition 4.1.1.c.)
- Coatings limited to a total HAP content of 3.5 pounds of HAPs per gallon as applied. (Condition 4.1.1.d.)
- Amount of coating consumed at the facility shall not exceed 7,310 gallons per year. (Condition 4.1.1.a.)
- Limit the amount of solvent with a xylene content of 80% or greater (xylol and T-5 thinners) to 1,083 gallons per year. (Condition 4.1.1.h.)

To demonstrate compliance with the established emission limits and other applicable requirements, the following parameters will be monitored:

Name and Product number of the coating applied.
Amount of each coating applied on a daily basis with monthly and yearly totals.
VOC and HAP content of the coating.
Amount of abrasive media consumed on a monthly basis.
Month inspections of the abrasive blasting enclosure.

The abrasive blasting activities are conducted in a shed (enclosure structure). The applicant did not propose any additional control device to limit PM for this activity. Therefore, the focus of the monitoring should be on maintaining the enclosure and the amount of media consumed.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that Daniels Fabrication, Inc. proposed construction of a mining machinery manufacturing facility meets all the requirements of the applicable rules when operated according to the permit application. Therefore, this writer recommends granting Daniels Fabrication, Inc. a Rule 13 construction permit for their metal fabrication facility near Bluefield.

Edward S. Andrews, P.E.
Engineer

Date: December 28, 2011